MAY-JUNE 1987

FAA Aviation NEWS

A DOT / FAA FLIGHT STANDARDS SAFETY PUBLICATION

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FAA Aviation NEWS

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BRIEFS

BELIEVE THE GAUGES. A drop in oil pressure of 5 lbs. and a slightly higher than normal oil temperature reading in a Cessna Skyhawk was noted by the owner, who brought the airplane into a maintenance shop for inspection. Following removal of the oil pan, a crack in the crankcase in the area of the main bearing journal was discovered. The pilot's attention to the engine gauges possibly prevented a serious accident had the inevitable engine failure occurred in flight.

EYEBALLING THE RUNWAY. Encountering people on an active runway is as unexpected as it is unsafe, but it happens—most recently at Winchester, TN, where a workman was struck and killed by an incoming Turbo Viking. The pilot saw a truck parked at the opposite end of the runway but was unable to contact UNICOM or to see two men at the approach end. FAA recommends runways undergoing repairs be closed and clearly marked with with an "X." Closure is mandatory at FAR Part 139 airports. See FAA Advisory Circular 150/5370-26, "Operational Safety on Airports During Construction."

SOGGY ENGINES. Turbine engines must be able to ingest simulated rainfall without surging, stalling, or flaming out. However, taxiing over surfaces where water has pooled could result in sucking in more water than some turbine engines can tolerate, leading to possible power loss on takeoff. Consult manufacturer recommendations for limitations on standing water depth acceptable for takeoff or taxiing.

A SHADE OF DIFFERENCE. Pilots know about the possible hazard of looking through aircraft windows with polarized lenses. Recent reports show two other potentially dangerous situations. In one case the pilot thought his aircraft had been incorrectly fueled when his drain sample looked pink—through his rose-colored sunglasses. In another case the pilot was able to see only the red, but not the magenta (turbulence) area on a color radar screen. His sunglasses were filtering out the blue spectrum, hence only the red was visible. Protecting your eyes is important, but consider a neutral tint.

WOULD YOU BELIEVE? Last issue the FAA General Aviation News' title was reduced to FAA Aviation News. This time we have even better news. In the U.S. Government Printing Office's Summer 1987 Price Catalog, the price of the magazine will be significantly reduced, because of a recent GPO price audit. Watch this space for further details.

TAKEOFF INSURANCE

Takeoff accidents involving engine failure in single engine aircraft generally belong in the category of accidents that need not happen. In the first place, the engine failure is usually a consequence of inadequate maintenance or preflight or fuel contamination—in other words, human rather than design error. And in the second place, inability to set the powerless aircraft down safely is almost always because of lack of preparation before takeoff—again human error.

Many pilots have taken off from the same airport for years without having a specific plan for dealing with an engine failure on any of the available runways. After dozens, or hundreds, of takeoffs have been accomplished without incident, one can be lulled into assuming that the engine will never stop until you cut the switch. The more reliable engines have become, the less attention we pay to emergency landing procedures.

What characterizes all power loss or engine failure accidents during takeoff is urgency. If your sole source of power fails, you may have only a few seconds to decide what to do about it and then to do it. This is no time to theorize, to ponder, to thumb through an Owners' Handbook, etc. Unless you are prepared in advance to make the right decision there is a pretty good chance you will make a poor decision, under the pressure of an abrupt loss of altitude.

Your first move, always, is to maintain control. Attempting a restart or radioing for help can wait until you have lowered the nose, leveled the wings, and established the proper glide speed.

Generally pilots who lose power at a low altitude are advised to land straight ahead (preferably on the runway, if there is enough remaining), accepting whatever relatively open space is offered, rather than attempting a 180-degree turn back to the airport, which might result in a stall with no chance for recovery. This is true most of the time, but occasionally you might find that powerlines, high trees, a busy highway, or a built-up area are lying straight ahead along the runway centerline. A strong headwind would also be a factor to consider. If you had taken the lay of the land previously you would be in a position to know whether a gentle turn (10 to 20 degrees) to the right or the left would improve your chances.

If the airport is your home base you want to keep yourself up to date on the condition of the surrounding land area, since this is subject to seasonal and man-made changes. The bare, hard earth you observed in the winter could turn into a bog after the spring rains or a pasture densely occupied by large cattle and crisscrossed by sturdy fences. In time it could even turn into a housing development. Before releasing the brakes for takeoff, ask yourself the question, "Where am I going to go if I lose power after leaving the ground?"

Of similar importance is the question, "At what point along the runway should I become airborne?" If you mentally mark the area, and you find yourself rolling past it with the airplane giving no sign of being ready to fly, you will know that something is wrong. Maybe you are not getting full power, maybe you are taking off downwind, maybe carrying excessive flaps, etc. If your visual cue helps you make a timely decision to abort, the chances are you will be able to stop the airplane safely on the runway—which is a lot healthier than hearing the engine stop 100 feet in the air.

If you have an engine failure after takeoff and you are able to establish a controlled glide toward a plausible landing area, you may have a few seconds in which to attempt a restart. There will usually not be time to look it up in the Handbook. You should have the manufacturer's recommendations firmly in mind or placarded at hand if it is not your aircraft. The necessary actions—fuel selector on an appropriate tank, fuel mixture full rich, carburetor heat and fuel pump on as indicated, etc.—should be taken before you try cranking the engine.

Statistically speaking, the most common cause of early engine failure is the result of taking on fuel contaminated with water and not making an adequate test for this possibility. For some of the smaller, highwing Cessnas, for example, it has been found that if you load watered fuel into an otherwise normal airplane, it will take off and climb to just about 300 feet on the uncontaminated fuel in the feeder lines. At this point there will be a heavy silence.

Occasionally pilots have been misled by an apparently successful restart and have abandoned a well-chosen emergency landing approach, only to find that the engine's revival was deceptively brief and the landing area no longer within reach. If you are confident about the landing, concentrate on that and leave the faltering engine for mechanics to ponder over later.

An approach to a deadstick landing from altitude is usually slightly steeper than a power-on approach, in order to give you some flexibility for dealing with the wind and other unknowns. After an engine failure on takeoff, you will hardly have time to think about the angle of approach. At low altitude—which is diminishing rapidly—you have to concentrate first and foremost, *on flying the airplane*. Unless otherwise advised by the manufacturer, do not add flaps until you are quite certain you can glide the desired distance to land. An overshoot is unlikely at low altitude, but if an overshoot is apparent, use flaps or a slight slip or both, as needed. Conversely, never, ever try to stretch a glide: entering a stall/spin at low altitude will only help the beneficiaries of your will.

For any off-airport landing you should be concerned about fire after impact. Turn off the master switch as soon as electrical power is no longer needed, shut off the ignition and the fuel before touchdown. Last but not least, assure that everyone on board vacates the aircraft as soon as you have it secured. ■

How To Save $ On Inspections

Most aircraft owners approach an annual inspection with the same feeling they would have about an impending IRS audit—a mixture of dread and loss: dread of what the mechanic might find wrong with their aircraft and possible loss of their life savings. Anyway you figure it, annual inspections will cost you money.

However, a concerned owner can reduce the cost of inspection and the elevation of blood pressure at the annual due date by performing thoughtful "Preventive Maintenance" on the aircraft year around.

"Preventive Maintenance," as defined in Federal Aviation Regulation Part 1, is the simple or minor preservation or replacement of small standard parts not involving complex assembly operations.

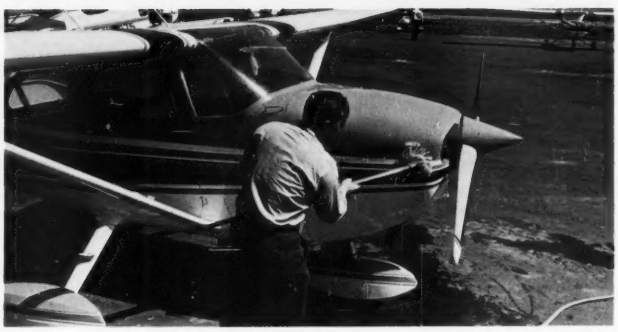
Well, that's fine and dandy, you say, *but how can I start saving money when I don't have a technical background?*

KEEP IT CLEAN

You can start with soap and water. A clean, well-waxed aircraft is the first line of defense against corrosion. Any mechanic will tell you corrosion repair and treatment is 90 percent labor and very expensive. Much of it can be avoided simply by regular washing and waxing.

The average light airplane has the surface area of a billboard and more nooks and crannies than an English muffin. These nooks and crannies serve as ideal water traps and dust bins. Only a small piece of unprotected metal is needed to create a breeding ground for corrosion, which can slowly eat through your aircraft. These areas must be kept clean and dry.

Care must be exercised that the wash and rinse debris is kept away from fuel filler ports and static and fuel vents, thereby ensuring that all drain holes are open. Otherwise you are inviting internal corrosion—and possibly also weight imbalance. For specific washing or waxing instructions consult your airplane owner's guide or service manual.



Inspection plate screws "welded" in place by rust prevent a mechanic from quick and easy access to vital areas of your aircraft he is required to inspect. To remove these screws, a mechanic must use a drill, screw extractor, and words not usually found in *Webster's Collegiate Dictionary*. The average replacement time is two to five minutes. Multiply that by 60 or 70 rusty screws, and you have four to six hours of labor at $35 an hour. Much of this expense can be avoided if the aircraft is kept clean so that rust can be detected early and the screws replaced by the pilot before rust spreads to parent metal of the aircraft.

TIRES

Those expensive, black, round things the aircraft stands on are the last part of the aircraft that leaves the ground and the first to arrive. They must be replaced all too often because they have been damaged or worn excessively. *Why?* Because the owner paid too little attention to the air pressure. As with cars, insufficient pressure can cause tire side-wall and tread damage, plus irregular tire wear

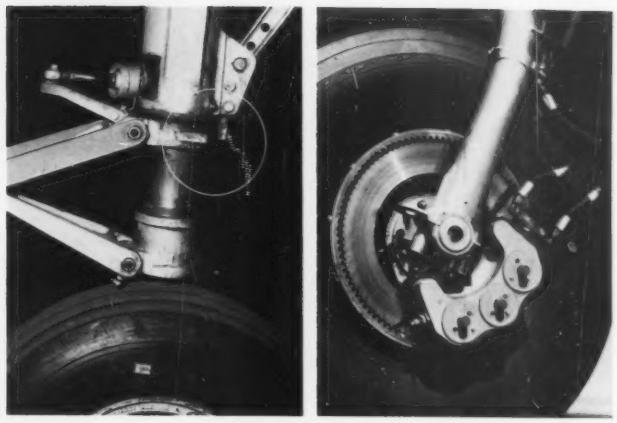
on the edges of the tread. Too much air pressure can cause the tire to wear out the center of the tread faster than normal and can even overstress the tire to the point of failure. An accurate tire pressure gauge and careful inspection during preflight will help tires last as long as advertised.

Recapped tires offer approximately a 15 to 30 percent savings over new aircraft tires—a point to consider if the inspection requires tire replacement. However, you should ensure that the recap supplier is reputable and provides you with properly certificated parts. Since recapped tires tend to run larger in diameter than new tires, owners of retractable gear airplanes should have a retraction test done to see if the wheels have enough room in the gear wells. Keep in mind that *all* tires will swell in diameter during use because of heat from ground and brake friction and runway temperature.

LANDING GEAR

On landing gear with hydraulic cylinders, the high air pressure and fluid in the cylinders are prevented from escaping to the outside by two or three "O" ring seals. While it is true that these seals are designed to wear and in time must be replaced, many are forced into early retirement by lack of preventive maintenance on the part of the owner. The "O" rings are not expensive, but their replacement can take up to two hours of labor.

To avoid premature wear of the "O" rings all the pilot/owner has to do is wipe the oil and dirt off the landing gear chrome struts during the preflight inspection. This procedure will reduce the chance of "O" ring wear caused by accumulated dirt and grime working between the seals and the strut during taxi, takeoff, and landing. This may cause deterioration or small cuts in the seals, which will develop into leaks, collapsed struts, and substantial dents in the bank account.



BRAKES

The brake systems on light aircraft are not complicated in design or function. The brake operation is similar to catching a frisbee. The back of your hand is the brake housing, your palm is the movable lining, your fingers are the fixed lining, and the frisbee is like the rotating brake disc attached to the wheel. To stop the frisbee or brake disc you squeeze. The simple operation is the good news; the bad news is that the brake lining is the sacrificial lamb which is slowly being worn away each time brakes are applied. These linings are made of several different materials which are impregnated with soft metals and then bonded together. The linings are attached to the floating and fixed back plates with two small brass rivets.

These rivets need 40 percent of the lining material to hold the lining onto the back plates. This allows only 60 percent of the lining to be used for braking. When more than 60 percent of the lining material has been worn away, the rotating disc will start cutting into the brass rivet heads. A few more hard brake applications will remove the rivet heads; the remaining brake lining will then fall on the runway, and aircraft control will suddenly become very complicated.

To avoid the avoidable, consider the following:

1. Inspect the brake lining frequently by laying the width of a paper match on the exposed lining on each side of the rotating disc. If you have brake lining visible, go fly; if you cannot see any lining because of the match, have new ones put on before the next flight.
2. You may have an airplane equipped with wheel pants which require a degree in aeronautical engineering for removal—what then? You can elect to have linings changed at specific intervals (50 to 100 hours) depending on your operation of the aircraft. Err on the conservative side. It is cheaper to change used but serviceable linings than to rearrange a battered airplane.
3. Just as important as the brake lining thickness is the fluid level in the brake hydraulic reservoir. If you notice the hydraulic fluid level keeps dropping, this is a sure indication of a brake system leak. When you suspect you have this problem, pump the toe brakes and/or parking brake several times, and then set the parking brake. Wait a few minutes, then take a clean white rag and wipe all the brake hoses, fittings, and brake cylinders installed under the instrument panel and on the toe brakes.

Inspect the rag each time for red hydraulic fluid stain after wiping each component. Use this same procedure at the brake housing and hoses attached to each main gear, paying special attention for cracks close to the brake hose fitting on the cylinder. With the "white rag" method you can "trouble shoot" the brake system and determine what components are leaking. This could save you the labor expense a mechanic would charge for doing the same thing during the inspection.

All these checks and inspections might not save you a great deal of money up front, but the confidence you will have in a good, dependable brake system could be worth every cent you have—if you are ever faced with a very short runway and a very light headwind.

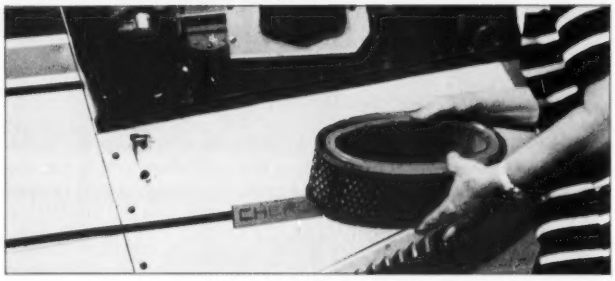
BATTERY

A $60 aircraft lead-acid battery is given all the respect due Rodney Dangerfield—until it does not work. Batteries run a close second to tires for early replacement—again because of lack of owner care. A battery needs only to be kept dry on the outside and wet on the inside. When you service a battery, fill each cell to the split ring with distilled water from a clean container. *Never use tap water.* An aircraft battery cannot handle the water we humans drink—too many minerals, fluorides, and random undetermined additives that could cause cell plates to break down.

During protracted periods of time when the aircraft is not being used or when the temperature drops way below freezing, it is a good idea to remove the battery and store it in a cool, dry, protected place. Make sure the battery is not sitting on a concrete floor but on a thick piece of wood or rubber mat. This will prevent moisture from causing the battery to discharge slowly.

If you have a dead battery **NEVER** charge it with a fast battery charger at the local gas station. This fast charge (which creates a lot of heat) will dump 25 to 35 amps on the battery cell plates. This might be tolerated by a larger automotive battery, but the smaller aircraft battery, with its narrower clearances between the cell plates and walls, cannot accept the fast charger's higher amperage and heat without causing the plates to bend and buckle and short out—and another aircraft battery dies by electrocution.

It is cheaper in the long run to have the local fixed base operator put a slow charge of two to three amps on your battery over a 10 to 12 hour period. This is the only way to bring the battery to top charge without damaging the plates.



OIL AND AIR FILTERS

Replacing engine oil, spark plugs, and air cleaners are more areas where you can save money. If they are in need of replacement at the time of inspection, the shop will not sign off on the aircraft until it is done—and it will cost you more if they do it.

MAINTENANCE RECORDS

The majority of mechanics with inspection authorization (IA's) will tell you that 10 to 20 percent of the labor they charge goes to research the maintenance records of the aircraft, especially airworthiness directives.

They will also tell you that the typical maintenance records for a general aviation aircraft are as disorganized as a rat's nest. You may find engine log books for engines that are no longer on the aircraft, AD's that were signed off on work orders but never entered in the maintenance records, weight and balance forms and equipment lists so old the pages are turning yellow, etc. So to save your IA some time and you some money, on the next rainy weekend when you cannot fly, sit down and spend a little time organizing your records.

If you are not sure of what you need to do first, get a copy of Advisory Circular AC 43-9B, "Maintenance Records," free from the DOT, Utilization and Storage Section, M-443.2, Washington, DC 20590. Also talk to your IA and ask him what he needs to see. While you are burrowing through your compost heap of information, stop and spend a little time regarding the aircraft owner's manual and the engine operation manual, to refresh your memory and see if you have picked up some bad habits since you read them last.

ANNUAL INSPECTION

The next suggestion to save money is not for everyone. Simply put, you become the IA's assistant or "gopher" during your inspection. You go on errands, find tools, loosen screws, remove inspection plates here, seats there, etc. You will get dirty and tired, but you may learn more about your aircraft in a day than most pilots do in 10 years, and if you do not get on your IA's nerves too much you will save money by reducing his time spent on the inspection.

For example, just by removing and reinstalling the cowling and inspection plates yourself can save eight to 10 hours on the average light aircraft. At $35 an hour you could ave $280 to $350. Now, not every IA or repair station is going to agree to this kind of contract. Some will not because of insurance liability, others because they simply do not want or need you there. However, the money you could save is worth a little shopping around for an amenable shop.

When you do pick out an IA or repair station, make sure you have a *signed contract* spelling out the cost of the inspection (this is usually a flat rate) and the cost per hour for any additional repairs or maintenance to be performed. This avoids any surprises, angry words, and hard feelings when the annual is finished. It is advisable to specify that for any work or cost of parts over a certain dollar figure the IA or repair station must get your approval before continuing on with the work. Again, that figure should be stated in the contract. Most reputable aircraft maintenance facility managers would prefer it in writing, to protect their interests as well as yours.

Remember that when you, as a non-mechanic owner, do "Preventive Maintenance" on your aircraft, you are still required by FAR Part 91 to make a logbook entry. You must identify the work you performed, the date you did it, the total time on the aircraft, and sign your name and pilot certificate number. This puts you on record as approving the aircraft for return to service after accomplishing the work performed.

You are also responsible for carrying out all preventive maintenance in the manner recommended by the manufacturer. Spark plugs, for example, must be torqued to the specified pressure, with a currently calibrated torque wrench.

Even with all these requirements, preventive maintenance is still one of the best ways, short of having an A & P mechanic for a son or daughter, to save money on your annual inspection. ■

(This article was prepared by Bill O'Brien, a specialist in the General Aviation and Commercial Branch of the Aircraft Maintenance Division.

THE DIRTY DOZEN

Airworthiness Inspectors in FAA Flight Standards District Offices have the opportunity to review the maintenance performed on hundreds of aircraft per year—preventive maintenance by pilots as well as professional work. The following is a list of problem areas commonly noted by these inspectors. Have you made or observed any of these mistakes lately?

1. **Inadequate checklist for inspections.**
2. **Failure to research or record Airworthiness Directives.**
3. **Lack of Type Certificate Data Sheet conformity.**
4. **Failure to include total time in 100 Hour and Annual entries (Airframe, Engines, and Propellers).**
5. **Failure to include time since major overhaul on appropriate components in 100 Hour and Annual entries.**
6. **Outdated Technical Manuals and data.**
7. **Failure to record maintenance in propeller logbooks.**
8. **Conducting Altimeter and Static System Tests under FAR §91.170. Since 1982, the proper FAR is §91.171.**
9. **Unauthorized preventive maintenance.**
10. **Pilots performing authorized preventive maintenance without making logbook entries.**
11. **Returning aircraft to service without having Airworthiness Certificate, Registration, Required Flight Manual, Equipment List Weight and Balance Data, or Placards in proper order.**
12. **Making logbook entries in unidentified logbooks.**

Personal Flying - Is It Fading Out?

Given the fact that major airplane manufacturers are no longer building single engine piston-driven airplanes, while the cost of light aircraft, either new or in good condition, is skyrocketing: Does this mean that the opportunity to fly for sport or fun is fading out of the picture in this country?

Not necessarily. Historically, if the airplane of our dreams was not available on the market or within our price range we have always had the alternative of building our own. Resorting to amateur built or homebuilt equipment is a facet of aviation, supported and regulated by FAA, which has always had a wide appeal in this country. Every year over a million aviation enthusiasts visit the annual fly-ins put on by the Experimental Aircraft Association in Florida and Wisconsin—to observe, learn, and exhibit proudly what they have wrought.

The number of currently certificated amateur built aircraft is not as large as these figures suggest: the present fleet numbers nearly 11,000 with about 8,000 active aircraft. The reason there are not more amateur builts is not the cost, or the hazard, or the lack of ability—but *time*. You cannot just go out and buy a kit, spend a couple of weekends hammering it together, and start flying your "homemade" aircraft. To qualify as amateur built (hence be eligible for an experimental airworthiness certificate) more than 50 percent of the construction work must be done by the owner. Unless you are retired or otherwise at liberty to spend as much time as you like on the fabrication, realistically you can expect to spend anywhere from one to three years on the task. It is not work that you want to do hastily or under pressure; you must build the craft as though your life depended upon your workmanship—because it probably will. The chances are you will be the first person to fly it, and if anything goes wrong you will be the first to know.

Many observers believe that what characterizes a good amateur aircraft builder is not necessarily mechanical knowledge or skill but his or her attitude toward the job. If you see it essentially as a given amount of labor, to be accomplished in the shortest time possible, you are likely to make mistakes, no matter what your previous experience or background is. If on the other hand you look on it as a challenge, if you are stimulated by the idea of getting airborne as a result of your own handiwork and taking full responsibility for the consequences, then the chances are that you will create something which is of first class quality. The attitude of the builder usually makes the difference.

Although FAA provides as much support as possible to amateur builders and a viewpoint which encourages individual initiative and responsibility, the extent of Federal surveillance is limited by the agency's resources. To begin with, FAA offers Advisory Circular 20–27C, "Certification and Operation of Amateur Built Aircraft" (free from DOT, Utilization and Storage Section, M-443.2, Washington, DC 20590). This AC provides general guidance for the building, certification, and operation of amateur built aircraft of all types; defines the eligibility of nationally advertised kits as they pertain to FAR §21.191(g); defines how much construction the amateur builder must do to have the aircraft be eligible for the special airworthiness certification; describes FAA's role in the certification process; and includes much valuable source and reference material.

As soon as the desired aircraft design has been selected, the prospective builder should contact the nearest FAA District Office, preferably in person, to discuss the project with an appropriate inspector. The type of aircraft, as well as its complexity in construction and operation, should be discussed and guidance will be given concerning the applicable FAA regulations and surveillance.

FAA does not carry out any inspections during construction of the aircraft, but relies upon logbook or permanent record entries signed by the builder, substantiating that the construction has been accomplished in accordance with acceptable workmanship methods, techniques, and practices—supported by photographic documentation of construction details. Before the official certificates are issued an FAA inspector will conduct a thorough examination of the completed aircraft and will approve a test flight area for initial flying.

The District Office will advise the amateur builder to discuss the project with certificated aircraft mechanics or designated engineering representatives and to contact experienced builders and pilots of amateur aircraft. One of the best places to find assistance is at the local chapter of the Experimental Aircraft Association. Talking with others who have built the aircraft you are interested in will give you a good idea of how difficult and time-consuming the task will be and how rewarding. Attending the fly-ins will give you an opportunity to see hundreds of different homebuilt models and discuss their handling characteristics with their owners.

How safe are homebuilts? Of the 2,568 general aviation accidents in 1986, 176 involved homebuilt airplanes with 36 fatalities. Put another way, the homebuilt airplane accounts for approximately four percent of the U.S. civil aircraft fleet and close to seven percent of all accidents.

USEFUL PUBLICATIONS

1. Free advisory circulars:
   DOT, Utilization and Storage Section
   M-443.2, Room 2314
   Washington, DC 20590
2. To be placed on FAA's mailing list for free advisory circulars:
   DOT, Distribution Requirements, M-481.1
   Washington, DC 20590
3. To purchase for sale advisory circulars and FARS:
   Superintendent of Documents
   U.S. Government Printing Office
   Washington, DC 20402

A good share of the accidents involving homebuilts occur when relatively untrained pilots take to the air with insufficient ability to control the high performance aircraft. One of the reasons why many people like amateur built airplanes is that they are usually very responsive, high performance machines with remarkably fast rates of climb and great maneuverability. If you have not had previous experience with a high performance aircraft but are accustomed only to non-aerobatic, forgiving trainers, you may not be able to handle what you have built without instruction.

Test Flights

Pilots who have spent a year or more building their own aircraft are naturally eager to make that first flight at the first opportunity. They tend to overlook the fact that the first flight is a *test flight*—equivalent to the test flights given standard production aircraft by professional test pilots, who are not emotionally involved with enjoying the fruits of their labors.

For the amateur builder and non-professional pilot, that first flight should entail considerable planning. Precautionary measures should be taken to minimize the consequences of any possible problem with the aircraft inflight. Ideally you should first get some flight experience in the same model of aircraft. If that is not possible, do some flying in the most similar aircraft available. At the very least, you should be current and have the appropriate logbook endorsement [FAR §61.31 (e)] for a high performance aircraft.

Next, for the first trial, select an airport that offers long, wide runways, broad clear terrain, and periods of very light traffic—preferably in the early morning, when winds are likely to be light and the air stable. The forecast weather for the flight day should be clear, and there should be no obstructions to visibility.

Next, get an experienced pilot to do the preflight inspection with you. This is not a matter of downgrading your ability, but of accepting the fact that your eagerness to go up might cause you to overlook something.

Install the best shoulder harness you can find and wear an approved parachute when flying at altitude beyond the airport vicinity. The latter item is no insult to your building skill, merely an acknowledgement that you are human.

The first preflight will necessarily be much more extensive than the routine checks you have performed on previously flown aircraft and should include the following:

FUEL. Check the fuel system for leaks, running at least five gallons of fuel through each tank. Be extremely attentive to the possibility of contaminants such as water or debris in the fuel or strainers.

FLIGHT CONTROLS. Check for correct travel, directional response, and freedom of movement.

Oshkosh, WI, annual scene of world's greatest amateur-built display

BRAKES. The brakes should be capable of holding the aircraft in place with increasing increments of power. Check the lines for any leakage of brake fluid.

INSTRUMENTS. With the engine running observe gauges, radios, and other electrical instruments for proper operation.

WEIGHT AND BALANCE. Perform a weight and balance computation using actual measurements to assure that the center of gravity is where it is intended to be.

Taxi Testing

The preliminary taxi tests should be performed at low speeds in very light winds, a day or so in advance of the first planned flight. Start at walking speeds and work up in small increments (five mph). Be sure that you can handle the aircraft easily and comfortably at each speed before moving on to the next. Avoid overheating the brakes. Four to five hours of preflight taxi testing is common. High speed taxi testing may be carried out just before actual takeoff.

First Flight

Accept only ideal weather and traffic conditions—calm, clear air, no obstructions to visibility, light or non-existent traffic. Limit the first flight to a few simple maneuvers: takeoff, climb to safe altitude for slow flight, shallow turns, and landing approach practice, followed by actual landing. Monitor engine instruments constantly and keep notes on any problems that develop—better still, have a companion on the ground who can write down your radioed comments. Go over these later with a competent engineer before you fly again.

Subsequent Flights

Each of your early flights (wearing the parachute) should be planned to accomplish something specific, so that you are establishing the validity of the performance envelope. Some maneuvers:

- Yaw the plane, then release. Does it return to straight flight?
- Trim for straight and level flight, then apply power—the airplane should climb.
- Does the stick return to neutral upon release?
- Stall characteristics should be tested at suitable altitudes, with caution.

Be constantly alert for unusual noises or vibration; reduce the airspeed if either is detected.

If all goes well; fine, you may be released from the confines of your flight test area after completing the time requirement for aircraft testing which is indicated on the operation limitations and then applying to the District Office. But remember how long it took you to construct the aircraft and do not expect to learn everything about its flight behavior overnight. After all, it is one of a kind.

USEFUL ADDRESSES

Experimental Aircraft Association, Inc. (EAA)
11311 West Forest Home Avenue
Franklin, Wisconsin
Mailing address: P.O. Box 229
Hales Corner, WI
53130
Phone: (414) 426-4800

DOT/FAA, Airmen and Aircraft Registry, AAC-200
6500 South MacArthur Boulevard
Oklahoma City, Oklahoma
Mailing address: P.O. Box 25504
Oklahoma City, OK
73125
Phone: (405) 686-4331

ASSISTANT PUBLIC PRINTER
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U.S. Government Printing Office
Washington, DC 20402

The WORLD'S GREATEST Airshow

by Paul H. Poberezny,

Founder and President of the Experimental Aircraft Association (EAA).

The idea of establishing an organization for amateur aircraft builders and restorers came to me in 1948 while I was building an airplane in the family garage at my home in Milwaukee. I held several informal meetings and discussions with other sport aviation enthusiasts on the subject, but we had to put the idea aside when I was called to Korea for a tour of duty as an USAF pilot. When I returned, we decided to try to capture the enthusiasm, skills, and dedication of a number of Milwaukee area amateur aircraft builders. Our first organizational meeting was held in January of 1953.

Eventually, it became possible to develop the first "real" EAA Headquarters and Air Museum in the Milwaukee suburb of Hales Corner. The Headquarters building gave our organization permanent roots and a sense of tradition. The annual EAA convention was first held in Milwaukee, then Rockford, IL, and, beginning in 1970, at Wittman Field in Oshkosh, WI. From its humble beginnings, our annual EAA Convention has become the world's largest and most significant aviation event of any kind.

From the very beginning it was important that EAA establish a good working relationship with the Civil Aeronautics Administration (CAA, now the FAA). That relationship was important if we were to develop appropriate and meaningful Experimental/Amateur Built Aircraft programs. Since I had been involved with the Government as a full time military aircraft maintenance officer and pilot, I had something of a natural feel for working with government officials. Soon I found myself in Washington frequently, representing a large non-government membership organization that was growing rapidly and would eventually have some 700 local chapters around the world.

In the past 35 years, nearly 300,000 people have joined and supported EAA. These folks come from all walks of life and represent all facets of aviation. They are homebuilders; they are restorers of antiques, classics, and warbird aircraft. Many of them are involved in the ultralight movement, and still others are committed to aerobatics. Most importantly, these aviation enthusiasts have joined together not only to focus on their own interest but to promote and support the entire spectrum of sport and general aviation activities. Today, some 13,000 aircraft carry an experimental certificate. This number continues to grow.

The experimental/amateur built aircraft category has changed very little since its inception. Gradually, as the amateur built aircraft movement grew, matured, and established its own high standards for quality and integrity, FAA has seen fit to lessen some of the restrictions placed upon it.

In reviewing the record of mishaps and accidents over the years, one finds a distinct parallel in the types of accidents and their causes, whether the airplane was built at home by an individual or in a factory by many different employees.

Today, EAA has a reputation for establishing the world's finest Aviation Center and Air Museum in Oshkosh, WI. This $10 million facility was made possible by contributions from individual EAA members and corporations who have looked upon the accomplishments of EAA as a national resource. The Annual EAA International Fly-In Convention and Sport Aviation Exhibition, which is held at Oshkosh, continues to grow each year. It is anticipated that nearly one million aviation enthusiasts will visit the EAA convention site during the eight days of the 1987 EAA Convention, July 31 through August 7.

Each year, FAA is well represented at the EAA Convention with officials from Washington and the many Regional offices who hold very popular forums with our visitors. Of course, many FAA controllers enjoy a hard "working" holiday as they handle traffic at what is temporarily the world's busiest airport. During EAA Convention week, nearly 64,000 operations are recorded, involving some 10,000–12,000 aircraft. This, of course, does not take into account the thousands of airplanes which land at nearby Fond du Lac and Appleton airports.

Incredibly, this massive celebration of human flight is made possible by the assistance of thousands of volunteers. Many of them arrive in Oshkosh in motor homes, early in the spring and stay late into the fall. Others arrive just in time for the convention and often work long, 18 hour days in order to keep the event running smoothly for their fellow aviation enthusiasts. Without these men and women, the EAA Convention would be difficult, if not impossible, to administer and organize.

The EAA Air Museum has gained a great deal of attention from aviation enthusiasts and scholars throughout the world. The museum has grown from a handful of aircraft to a major exhibit of the accomplishments of the men and women in aviation. EAA currently has over 200 aircraft in its collection. Directly behind the Air Museum itself, EAA has established Pioneer Airport. This return to the golden days of aviation includes a 2,500 foot grass airstrip and two large hangars filled with rare, genuine antique aircraft, many of which are flown on weekends to the delight of museum visitors.

What is the place of the amateur aircraft builder in the world of aviation today? This question has become increasingly important to all of us in aviation especially since there are very few reasonably priced aircraft available to the average American of modest means. Many believe that as a grass roots organization, EAA is filling the gap by holding together the dedication and commitment to personal aviation through the activities of its 700 chapters. The vast majority of communal aviation activities conducted throughout the United States each year are organized and promoted by EAA chapters.

No, aviation is not dead. Men and women have dreamed of personal flight for centuries. Now that the dream has come true, we must continue to nurture it—not to overregulate or restrict it. We must also recognize that we human beings are frail and imperfect. We will never be perfect, and we will continue to make mistakes for which we sometimes pay a very dear price. We must be careful not to sacrifice our rights, privileges, and freedoms in a vain and futile attempt to ensure complete safety in everything we do. That is not how we got to the moon.

Working together and using the full resources of the aviation community, we can make aviation as safe as humanly possible without sacrificing the challenge of flight. ■

Foggy WEATHER

Late spring and early summer are pivotal seasons when climatic changes taking place over the earth encourage the formation of fog. This surface obscuration has bedevilled navigators on land, sea, and in the air ever since travel began—and it is still a serious cause of aircraft accidents. Fog is a seemingly benign form of cloud, devoid of turbulence or precipitation (usually), but because it is in contact with the surface it seals off landing facilities and mountain passes with little or no warning. All fog tends to look alike to a pilot, but it is formed and it dissipates under a variety of conditions with which airmen should be familiar.

Fog is a cloud composed of water droplets or ice crystals, depending on the temperature, which lies on the surface of the earth. Since fog normally forms in very stable air, there is little or no collision between the extremely small droplets or ice crystals. Therefore, a large number of these suspended particles must be present before visibility is greatly reduced. However, fog dense enough to restrict visibility to a mile or less can form quite rapidly—a gradual thickening does not always occur. An example is the sudden increase in fog density that often occurs shortly after sunrise.

Fog may form by the air cooling to its dew point or by the addition of moisture to the air near the surface. Ideal atmospheric conditions for fog formation are: high relative humidity (small temperature-dew point spread), an abundance of condensation nuclei, light surface wind, and some cooling process to start condensation. Fog is, therefore, more prevalent in coastal areas where moisture is abundant. Even when the relative humidity is less than 100 percent, fog is persistent in industrial areas, where products of combustion provide a high concentration of condensation nuclei. Fog occurs more frequently in the colder months, but the season and frequency of occurrence vary from one area to another.

Various types of fog are based upon the way they are formed. In many cases, more than one process is operating at the same time.

Radiation Fog

More commonly called "ground fog," radiation fog is the result of ground cooling on clear, calm nights. The ground cools the air to the dew point temperature. It is restricted to land areas because water areas do not have much daily variation in temperature. It forms almost exclusively at night or in the early morning and usually disappears within a few hours after sunrise. Ground fog favors flat land areas.

Light wind, up to about five knots, produces a slight mixing of the air, which tends to deepen the fog by spreading the cooling through a deeper layer. Radiation fog is usually very shallow where there is no wind flow.

Advection Fog

This type of fog forms when moist air moves over colder ground or water. Very common along coastal areas, it is often called "sea fog" when occurring at sea. It can also form concurrently with radiation fog.

Advection fog deepens as the wind speed increases, up to about 15 knots. Stronger winds lift the fog into a layer of low stratus.

The west coast of the U.S. is quite vulnerable to advection fog. It frequently forms offshore, largely as a result of very cold water from the ocean depths rising to the surface. The fog is then carried inland by the wind.

Advection fog over the southeastern U.S. and along the Gulf Coast results from moist tropical air moving over cold ground. It is, therefore, more common in winter than summer.

Continues on back cover

1927 FAMOUS FLIGHTS 1987

The Airster - First Certificated Aircraft

The Buhl J-4 *Airster* of 1927 was a modest airplane by any commercial standard. The radial engine biplane accommodated one pilot and two passengers in open cockpits, and it delivered a payload of 440 pounds as it lumbered along at a cruising speed of 110 mph. It was quickly crowded out of the aviation scene by more advanced designs and is virtually unknown today, except to historians. But the *Airster* has a secure niche in the annals of aviation because on March 29, 1927, an *Airster* was the first aircraft ever to fly with a type certificate bearing the seal of the United States Government. This unassuming bit of paperwork is credited with having laid the groundwork for what was to become the American domination of the aviation industry.

Before 1926, Americans who engaged in flying for a livelihood could go about their business and scarcely notice the existence of any Federal, state, or local authority. A few minor exceptions aside, their access to the air was totally unencumbered. They needed no official approval to fly or to own or to build an aircraft for any purpose.

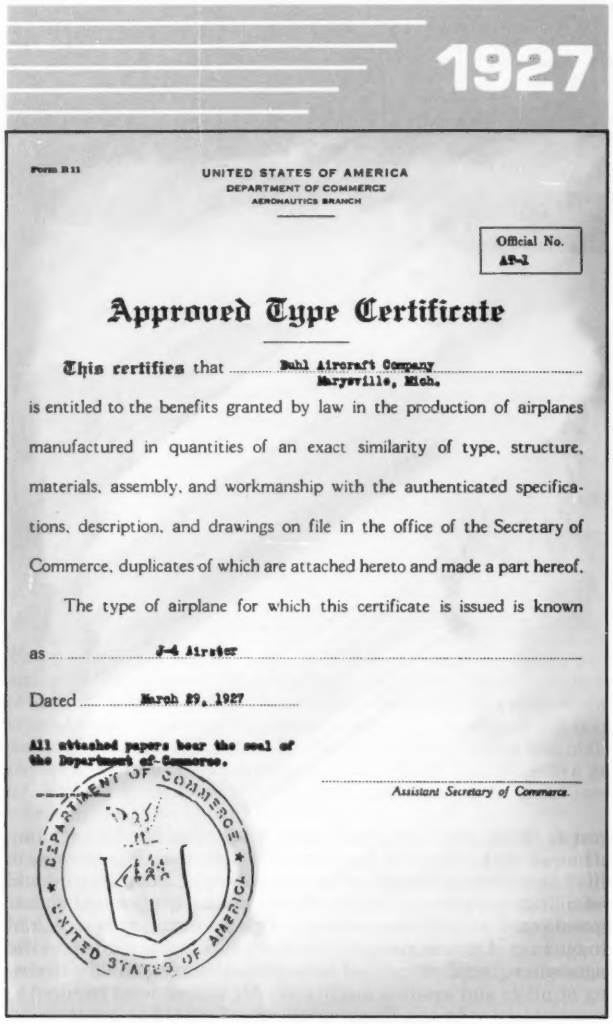
Many ex-World War I pilots picked up war-surplus aircraft and engines for the proverbial song, then patched them up and pressed them into service either on airmail routes or in charter operations. They did a brisk business in these old *Jennys* and *Standards*, as did spare parts suppliers. The term "airworthiness" was yet to be invented. If something went wrong inflight, you landed anywhere and fixed it as best you could. It was no wonder that to a great majority of Americans aviation was a rich man's sport or a daredevil's game.

By the mid-1920's, an increasing number of people were coming to the conclusion that aviation could not become commercially successful as a form of transportation without Federal safety regulations. Public acceptance was hampered by experience with badly engineered, badly built, or badly repaired aircraft.

A long seven-year Congressional debate came to an end on August 11, 1926, when the Air Commerce Act established a small unit of bureau rank within the Department of Commerce. The purpose of this "Aeronautics Branch" was to promote aviation by devising and enforcing a framework of safety regulations for the construction and operation of aircraft in commerce. The Aeronautics Branch laid down a set of commonsense air traffic rules and provided for the registration, certification, and inspection of aircraft and the licensing of pilots and aviation mechanics. All aircraft were required to be registered with the Department, which would assign them an identification mark for permanent display on the fuselage. Initially, only aircraft engaged in interstate or foreign commerce required a Federal license—that is, a certificate attesting to their airworthiness. Aircraft used for pleasure or other noncommercial purposes, even if crossing state lines, did not need a license, although they could be licensed at the option of the owner. All pilots operating certificated aircraft required a license, as did mechanics repairing such aircraft.

The Aeronautics Branch recognized at the outset that certification must begin at the manufacturing plant. If it did not, Branch inspectors might be forced to take apart every aircraft that came out of the factory. That was clearly out of the question; the meager resources of the branch's Engineering Section could count only eight airplane factory inspectors among its ranks at the nine district offices across the country. So the branch hit on a fundamental solution. It instituted a single certificate that covered *all aircraft of identical design and construction—the type certificate.*

In October 1927, the Aeronautics Branch issued a handbook setting forth minimum engineering standards that aircraft manufacturers had to meet to secure type certificates. Manufacturers were required to submit drawings and stress analyses of preproduction aircraft to the Engineering Section for approval. If the data conformed with the Government's standards, a Federal inspector visited the factory to determine whether the manufacturer was follow-



1927

Form R 11

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
AERONAUTICS BRANCH

Official No.
AR-1

Approved Type Certificate

This certifies that Buhl Aircraft Company, Marysville, Mich.

is entitled to the benefits granted by law in the production of airplanes manufactured in quantities of an exact similarity of type, structure, materials, assembly, and workmanship with the authenticated specifications, description, and drawings on file in the office of the Secretary of Commerce, duplicates of which are attached hereto and made a part hereof.

The type of airplane for which this certificate is issued is known as J-4 Airster

Dated March 29, 1927

All attached papers bear the seal of the Department of Commerce.

Assistant Secretary of Commerce.

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

First ever U.S. type certificate

ing the approved design and specifications and acceptable levels of workmanship. This was followed by flight testing one aircraft of the type being manufactured, first by a company test pilot, then by a Federal inspector.

When the tests were passed, the aircraft was issued an approved type certificate, which authorized the manufacturer to produce aircraft of "an exact similarity of type, structure, materials, assembly and workmanship" to the test model. Individual airplanes of the approved type received an airworthiness certificate (or license, as it was then called) after the manufacturer certified in an affidavit that he had followed the specifications of the type certificate and that the individual aircraft was flight tested by an Aeronautics Branch inspector.

Engines were also type certificated. Here, however, the Aeronautics Branch adopted the cumbersome procedure of requiring the manufacturer to deliver an engine to Washington, DC, for evaluation. Among other things, the engine was given a 50 hour endurance-block test by engineers in the Washington-based Bureau of Standards. Immediately following, the engine was torn down and a detailed inspection was made of its parts. Failure of a major component during the block test resulted in the denial of a type certificate.

Type certification proved such an efficient procedure that it was soon expanded to propellers and then to other aircraft components. This is not to say that everything ran smoothly from the start. Indeed, the understaffed Engineering Section was literally overwhelmed by the number of certificate applications that poured in from manufacturing concerns.

Funds for regulatory activities were in short supply, and the Federal salary scale for aeronautical engineers could hardly compare to wages available in private industry. This led to what industry believed was an inordinately long type certification cycle.

Some manufacturers had to wait months to secure approval of a minor change in an aircraft that already possessed an approved type certificate. Shuttling engines (for approval) across the country to Washington, DC, from California, which was rapidly becoming a center of aeronautical manufacturing, was especially time consuming and irritating. Only slightly less irritating was the long distance that many industry engineers were forced to travel in order to confer personally with Aeronautics Branch personnel.

The Government, however, was not solely responsible for the disappointing rate of processing. More than one manufacturer submitted inadequate or hastily drawn data that had to be shipped back for further work. The reliability of aircraft engines was a serious concern. Shoddy design and poor workmanship were prevalent among certain manufacturers. Some engines broke down during the first few hours on the endurance block. By the end of 1928, the Engineering Section had rejected more than 50 percent of the engines tested. Half of the rejects, according to an Aeronautics Branch official "would not have stayed in the air four hours." All this slowed down and increased the cost of the certification process, but in the long run rigid safety standards proved to be the backbone of the industry.

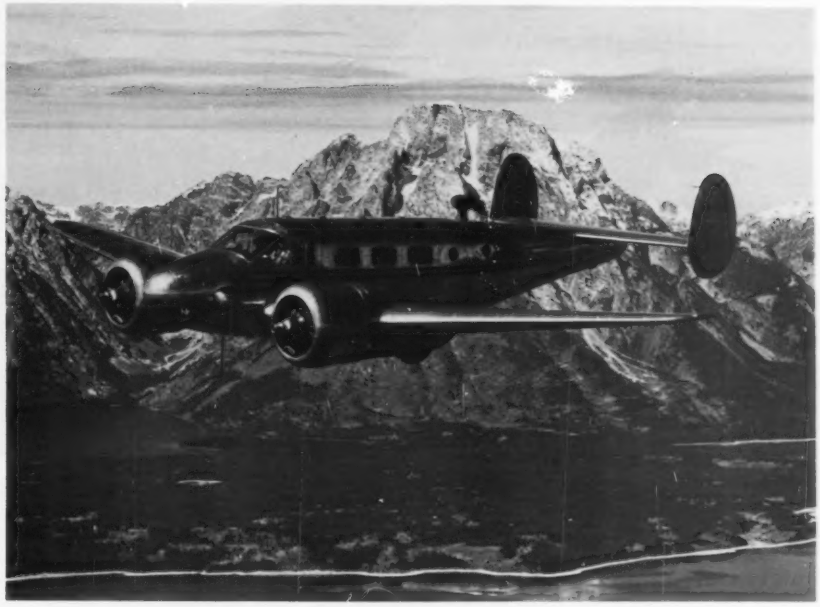
It was difficult particularly in the early days of the Aeronautics Branch to tell a manufacturer that he might as well stop production because his aircraft was not airworthy. In some cases stopping production would have put him out of business. The pressure on Federal officials led to the Aeronautics Branch granting manufacturers temporary certificates so they could continue building while correcting their deficiencies as they went along. The result was a number of "curious accidents" during 1927 in the light commercial airplane class: wings flew off, fuselages failed, and aircraft suddenly lost stability. Fortunately for the industry—and for the Branch's reputation—this kind of seat-of-the-pants certification was aborted.

In addition to certificating new designs, the Branch faced the problem of what to do with World War I surplus aircraft, particularly those already in commercial service. Over a 10-month period, war surplus aircraft experienced structural failures at twice the rate of postwar equipment. A general ban, which had been contemplated, was not imposed. Instead, the Branch determined whether these aircraft were airworthy on a case-by-case basis, requiring them to be "of original specification and design" and to pass the same flight test required of new aircraft. In the end, only a fraction of the existing war surplus equipment was certificated.

Many aircraft manufacturers had feared that the establishment of Federal airworthiness standards might tend to stifle design innovation. That did not turn out to be the case. Federal regulators were not interested in design per se; they were only interested in whether or not an airplane was safe. So they did not intervene in the design process. Indeed, they gave manufacturers the greatest latitude in developing new equipment. Manufacturers were not slow in exploiting this freedom. By January 1931, nearly four years after the *Airster* was certificated, the Aeronautics Branch had issued approved type certificates for 390 airplanes and 65 engines. Today, the approved type certificate is at the core of Federal procedures for certificating aeronautical products. No aircraft leaves the ground without one. ■

Editor's Note: This article is derived from information in Bonfires to Beacons, *an aviation history written by Nick A. Komons, the FAA's Historian.*

Fowl Air



Everyone hears about hypoxia but many of us learn about it the hard way, and only then do we really begin to respect it. The following article relates an experience by **John H. Doster,** *veteran FAA Flight Standards inspector and currently manager of the Allentown, PA District Office. It happened over 40 years ago, but he has never forgotten the lesson he learned.*

Shortly after taking off from Brownsville, at the southeastern tip of Texas, I learned that both the Brownsville and the Tampico, Mexico airports were closed by dense fog. I was returning to Mexico City by way of Tampico, flying the C-18S twin Beech that was assigned to the Civil Aeronautics Administration (predecessor of FAA) mission at the United States Embassy. Mexico City's weather was well above the published minimums, with high clouds topping out at 15,000 feet. My load consisted of a kitten for my young son, supplies and mail for the embassy, and some 500 baby chicks.

As I was flying over Tampico at 5,000 feet, in clouds with about 200 miles to go, an almost overwhelming smell of gasoline filled the airplane. My immediate reaction was to kill all the electrical circuits and take the generators off the line. The gasoline fumes were so strong that I was sure a fuel line or tank had ruptured (It proved subsequently to be a tank failure.), and I was concerned about the possibility of an inflight fire being started by an electrical spark.

My next thought was to climb on top of the cloud deck and line up a landmark in the vicinity of Mexico City, so that I could proceed without electronic navigation. My best bet was the towering volcano known as Popocatepetl, located just southeast of the Mexico City airport. The top of Popocatepetl is at 17,887 feet above sea level, which makes it pretty easy to sight. After breaking out of the clouds at 16,500 feet I spotted the snow-capped peak of the volcano off to my left. When I got close enough I planned to make a slow descent on a northwest heading away from the peak, which would take me to the vicinity of the Mexico City airport. Simple.

As I flew along peacefully at altitude it slowly dawned on me that I could no longer hear the chirping of the chicks in the cabin. A glance behind me disclosed that there was no movement in the chick cages. The kitten was lying motionless in the aisle and looked dead. Hypoxia! I had been so engrossed with my flight problems, created by going off the radios, that I had forgotten about the effect of flying at 16,500 feet without supplemental oxygen, not to mention exposure to gasoline fumes.

Not as much was known about hypoxia in flying then as now, but I did know it means a depletion of oxygen in the body cells and tissues. At sea level, standard air has a pressure of 14.7 lbs. per square inch (psi), which consists of about 21% oxygen, 78% nitrogen, and small traces of other gasses. As you move up in altitude the pressure decreases, making less oxygen available for body function. At 18,000 feet the total atmospheric pressure is down by half, about 7.3 psi, of which our life-giving oxygen component is only about 1.5 psi.

I also know that the average pilot cannot perform his cockpit tasks effectively for more than 30 minutes between 15,000 and 18,000 feet. This is reduced to 10 minutes at 20,000 feet and from one to two minutes at 30,000 feet.

In the absence of supplemental oxygen, the onset of hypoxia symptoms comes inevitably with increases in altitude, but it can be hastened by anemia or poor circulation of the blood, brought on by chronic disease or general poor health. Smoking also greatly reduces the ability of the blood to absorb oxygen. You can have any or some or all of the symptoms: euphoria (feeling super), tiredness, headache, vision problems, rapid breathing, sleepiness, clumsiness, labored thinking, tingling of the skin, dizziness, etc. At night lack of oxygen can begin to affect your vision at altitudes as low as 5,000 feet. Being young does not exempt you. My youthful responsibilities as a pilot required frequent flights at 18,000 feet without supplemental oxygen, and bouts of hypoxia were commonly experienced.

On this particular flight in Mexico, up until the moment I looked back at my "live" cargo, I hadn't been aware of any hypoxia effects on my flying, but pretty soon I realized that I was not altogether clear-headed and my vision seemed somewhat contricted. There was no oxygen equipment on board, so there was nothing I could do but remind myself to stay alert, descend as soon as possible, and follow my checklist for what had to be, in my judgement, a no-radio approach. I decided not to risk turning on power to lower the landing gear, either, and handcranked the wheels down when the time came.

Fortunately the Beech was landed at the Mexico airport without incident. Naturally, as soon as I parked, a large number of officials surrounded me, asking why I had not communicated by radio with the tower. By way of explanation I removed the chick boxes and opened them on the ramp to show that I really had experienced a problem.

The baby chicks looked dead, but as we talked they revived and started jumping out of the boxes and running around. The kitten also revived, fell out of the cabin onto the ramp, and started chasing the chicks. Hastily the officials left me and scrambled about trying to round up the chicks and the kitten. In their excitement over the chase, their ire toward me evaporated, happily. Not one chick out of all 500 was lost, although I almost stepped on several while trying to catch them.

Maybe I was still oxygen depleted. ■

AvNEWS

SOUND MUFFLER. A Sterling Airways (Denmark) 727-200 has engine modifications intended to achieve compliance with current noise standards. Such modifications, which are still under development, include the installation of an exhaust mixer on the center engine and the replacement of the outboard engines with Pratt and Whitney JT8D-21TA engines which have acoustically treated nacelles. The modifications, subject to FAA approval, may not only reduce noise but may also improve fuel efficiency and engine performance.

SPECIAL REGULATIONS IN EFFECT OVER GRAND CANYON PARK

The Special Federal Aviation Regulation (SFAR 50) concerning the Grand Canyon National Park has been issued and will remain in effect until June 15, 1987. This temporary rule establishes a Special Flight Rules Area from the surface to 9,000 feet MSL in the area of the Grand Canyon. Flight in this area is now prohibited to any aircraft unless the operator:

1. Holds a FAR Part 135 certificate with specific authorization for the canyon,
2. Is authorized in writing by the Las Vegas Flight Standards District Office,
3. Is on an official search and rescue mission involving the canyon, or
4. Has a pertinent need to be there and received authorization.

The rule provides specific details, but basically operators not indicated above will not be allowed below the rim of the canyon. Those who are allowed below the rim must stay at least 500 feet from the terrain and structures as well as monitor common frequencies and make position reports.

FAA expects to replace SFAR 50 by mid-June with a permanent regulation, which may differ from the temporary regulation. For a copy of SFAR 50, write to FAA, Office of Public Affairs, Attn: Public Information Center, APA-430, 800 Independence Ave., SW, Washington, DC 20591, or call (202) 267-8521.

PUBLICATIONS

A new list of 79 recently published FAA scientific and technical aviation reports is available from the National Technical Information Service. The subjects include aircraft safety and airport technology, aviation medicine, navigation weather, etc.

To obtain the list of publications and prices, write to FAA, Office of Public Affairs, APA-300, 800 Independence Ave., SW, Washington, DC 20591. Ask for News Release FAA 07-87.

CUSTOMS OVERFLIGHT EXEMPTIONS

As part of the U.S. Customs Service's continuing effort to curtail narcotic smuggling, it has tightened the qualifications for crossing the southern border into the U.S. without first landing at a designated international airport of entry.

When operating with an exemption from the requirement for landing at designated airports, an IFR flight plan must be filed with an en route altitude above 12,000 feet MSL and the words "CUSTOMS OVERFLIGHT" indicated in the remarks section. The aircraft must carry an operating Mode C transponder, and the words "CUSTOMS OVERFLIGHT" must be included on initial contact with U.S. air traffic control and each time control is transferred to a new frequency.

To ensure aircraft operators follow these procedures, Customs has asked the FAA's assistance in monitoring the limited number of operators with approved exemptions. If a Customs overflight aircraft deviates from one of these requirements, ATC will notify the U.S. Customs Service.

For more information on "Customs Overflight Exemptions" contact your local Customs office.

VERIFYING PILOT RECORDS ON DRUG ALCOHOL ABUSE

A program designed to identify pilots who fail to declare drug or alcohol related convictions, if any, on FAA Form 8500-8 (Application for Airman Medical Certificate) is now in place. Information from the FAA's automated medical certification data base will be sent to the Federal Bureau of Investigation to be matched against criminal history records in the FBI's identification division. Any criminal history records resulting from this match will be reviewed and verified, as necessary, with Federal, state, and local enforcement agencies.

If, after verification, a study of FAA Form 8500-8 shows that omission or false statements have been made by an individual pilot, the information will be given to FAA for administrative disposition and to the Justice Department for possible criminal action. The entire program is expected to take nine months and be maintained under strict security.

NOTE: DOT is permitted to disclose from its system of records the names of individuals to another agency for use in law enforcement activities, either civil or criminal, or to expose fraudulent claims. The authority comes under item 9 of the Departmental Privacy Act General Routine Uses.

VISUAL STANDARDS

There has been a revision in the *Guide for Aviation Medical Examiners* regarding applicants for first or second class medical certificates who fail to meet FAR Part 67 vision standards. If the applicant's uncorrected distant visual acuity is worse than the current requirement of 20/100 but not worse than 20/200, a special ophthalmologic evaluation report will no longer be required, and the AME will be authorized to issue a certificate if the applicant is otherwise qualified.

This change applies only if in the course of the clinical examination required for certification the AME finds no evidence of significant underlying pathology. A Statement of Demonstrated Ability will be issued if the Aeromedical Certification Branch concurs.

For those whose uncorrected distant visual acuity is worse than 20/200 or whose vision does not correct to 20/20, FAA is retaining the current procedure which requires non-issuance by the AME, completion of an ophthalmologic evaluation (FAA form 8500-7), and submission of all documentation to the FAA Aeromedical Certification Branch in Oklahoma City, OK. Procedures for granting special issuances to third-class applicants, where necessary, remain unchanged.

FAA AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA AVIATION NEWS, AFS-810, Washington, D.C. 20591.

• Fuse Warnings

In the Brief on "Hot Feet" in your Jan/Feb issue you listed the culprit in a wiring fire in the cockpit as a 15 amp fuse, incorrectly replacing a five amp fuse.

My question is, does it really matter what size fuse that was put in as a replacement? Isn't the real problem here the fact that a pilot apparently disregarded the warning for circuit trouble given to him by the blown five amp fuse?

J. Wood
Seattle, WA

Very well put. Fuses are designed to call attention to wiring problems which may not be apparent to the untrained eye. A maintenance technician should inspect the circuit before the aircraft is flown after any fuse failure.

• Counselling or Enforcement

The article, "Presidential Overflights," in the March/April 1987 issue of **FAA Aviation News,** *may have inadvertently left the reader with the impression that airmen who do not heed FAR §91.104 would be liable only for a counselling session from an Accident Prevention Specialist (APS). Is that the actual extent of enforcement?*

Name Withheld

A violation of FAR §91.104 is treated like any other violation of a FAR. The incident is investigated by an FAA inspector, and a decision is make to pursue enforcement action or not. If investigation shows that the infraction was inadvertant or unintentional, counselling by an APS could be one of the options for closing out the file. However, when sufficient evidence exists, enforcement procedures could result in a civil penalty, suspension, or revocation of the airman's certificate.

• CFI Without a Medical?

I have been told that a certificated Flight Instructor who has lost his medical can still instruct in flight as long as he does not act as pilot-in-command. This seems contrary to FAR§ 61.19 which states that a flight instructor certificate is valid only while the holder has current pilot certificate and a medical certificate appropriate to the pilot privileges being exercised.

Would instruction from a CFI who has been denied a medical certificate be accepted for an additional rating?

Name Withheld
Potomac, MD

That depends on the nature of the instruction. The need for a valid medical certificate and its relationship to the flight instructor certificate is discussed in Far Part 61 Certification Bulletin No. 61-2. The bulletin states that if a CFI is on board an aircraft for the purpose of providing flight instruction, but does not act as PIC or as a required crewmember, that CFI is NOT exercising pilot privileges which require possession of a current medical certificate under Far Part 61.

Accordingly, a CFI, who does not hold a current medical certificate, but is not acting as PIC or as required flight crewmember, may give creditable flight instruction to a pilot who is fully qualified and currently rated to act as PIC for the aircraft. A non-medically current CFI is NOT permitted to give flight instruction to a student pilot; to a pilot whose BFR has lapsed or who is otherwise not qualified, rated, and current in the aircraft; to a non-instrument rated pilot in IMC or to an instrument rated pilot in IMC or on an instrument flight plan; or to a pilot practicing instrument flight under a hood (which requires the presence of a safety pilot).

• More on Hoods, PIC's

Back to the subject of logging instrument time, how about these situations:

1. Pilots A and B are both current and rated for the airplane they are flying in VMC but on an instrument flight plan. Pilot A is instrument-rated and current, Pilot B is IFR rated but not current, Pilot B wears a hood and manipulates the controls. Who may be pilot in command of this aircraft and who can log what?

2. Both pilots are instrument-rated and current, as well as rated and current for the aircraft. Pilot B again wears a hood and manipulates the controls. Who is and/or logs what?

Finally, I understand that an instrument competency check my be given by a certificated instrument flight instructor in a ground trainer. When this takes place, may the instructor also sign off on the pilot's BFR renewal?

Greg Bush, CFI
Huntington Beach, CA

1. When an aircraft is on an instrument flight plan, the actual PIC must be a pilot who is instrument rated and current (as well as otherwise rated and current in the aircraft). In this case the PIC. Pilot A would also be the safety pilot. However, Pilot B may log as PIC time that time during which he or she is the sole manipulator of the aircraft controls.

2. With both pilots fully rated and current for the aircraft and the flight conditions, either may be the actual pilot-in-command, in accordance with prior agreement. There is no reason why the actual PIC may not wear a hood or function as safety pilot (obviously he or she may only do one or the other, not both). The hooded pilot may, if so agreed upon, be the actual pilot-in-command and log the entire flight as PIC. The safety pilot may not log PIC time unless it is agreed that he is to be the actual PIC. In the latter case, the hooded pilot may only log as PIC the time he actually manipulates the controls.

Finally, a Biennial Flight Review may not be given in a flight simulator or trainer. Such a trainer may be used for the instrument competency check, but only in conjunction with a written letter of approval issued by the local Flight Standards District Office.

• Automatic Shutdown

I have been informed that while operating my single engine aircraft under FAR Part 91 VFR operations, should one of my original equipment systems, such as a radio, gyro compass, or carburetor temperature gauge, etc., become inoperative, my aircraft is grounded until that item is fixed.

Is this a true statement?

Walt Myers
San Antonio, TX

Under current regulations that is correct. The agency is drafting a rule change that may provide operators of single engine aircraft with an approved minimum equipment list that should provide some relief.

INSTRUMENT CORNER

• Holding Pattern Approach

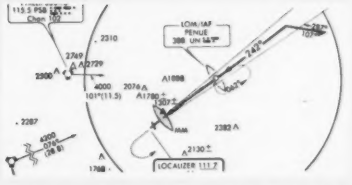
I have some questions about holding patterns and procedure turns as they relate to flying instrument approaches.

Firstly, from the holding pattern could I execute the ILS Rwy 24 instrument approach procedure (IAP) at State College PA, or do I have to fly the procedure turn as part of the approach? Is there a general rule or procedure which addresses this question? I've noticed that in some cases IAP's have a note which says, "Final approach from the XYZ holding pattern not authorized." Why not?

Second question: At the VOR-B approach to the same airport, why is a holding pattern depicted for course reversal instead of a procedure turn?

Name Withheld
University Park, PA

The answer to your first question is no, you may not execute this ILS Rwy 24 IAP at State College from the holding pattern.



This is a missed approach holding pattern (as shown by the dashed line) and was not designated for entry to the approach. You must fly the procedure turn. At the holding pattern (4,000') you would have to make an excessively steep descent in order to intercept the glide slope before landing. This is the usual reason for not authorizing approaches to be made directly from a holding pattern.

At the VOR-B approach the holding pattern was designed to initiate the approach because this maneuver will require the use of less airspace—which is limited at some terminals—than a procedure turn.

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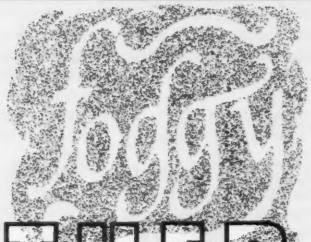

WEATHER

Upslope Fog

This fog forms as a result of moist, stable air being cooled by forced ascension up a sloping land surface. An upslope wind is necessary not only for its formation but also for its continued existence. If the wind becomes strong, the fog lifts and becomes low stratus clouds.

Upslope fog is common over eastern slopes of the Rockies and somewhat less frequent east of the Appalachians.

Steam Fog

The movement of cold air over much warmer water causes intense evaporation. This usually adds enough water vapor to the cold air to saturate it, forming steam fog. Steam fog rises from the water surface like smoke, and it is sometimes referred to as "sea smoke."

Since steam fog, unlike advection fog, forms over a warm surface, heating from below tends to make the air unstable. Therefore, turbulence and icing often occur in this type of fog.

In autumn, steam fog is sometimes observed over rivers and lakes in the middle latitudes. Water surfaces cool much more slowly than land surfaces this time of year and are still relatively warm compared to an invading cold air mass. It occurs frequently in the winter over open bodies of water in polar regions.

Precipitation-induced Fog

The addition of moisture to the air through evaporation of rain or drizzle causes what is known as precipitation-induced fog. Evaporation can occur when precipitation is falling through the air and after it reaches the ground. Although it is most frequently associated with warm fronts, it may sometimes form with cold and stationary fronts. Other factors being favorable, it can occur with nonfrontal as well as frontal precipitation. Precipitation-induced fog usually forms rapidly when associated with a front and covers a large area, especially when it accompanies warm-front precipitation.

Ice Fog

"Ice fog" forms in moist air during extremely cold, calm conditions. The tiny ice crystals composing it are often called needles or spicules. Very bright reflections or shimmering lights result when the sun shines on these suspended particles. Effective visibility is largely dependent upon whether or not you are looking toward the sun. Ice fog is not uncommon as far south as the northern plains states, but it occurs mostly in the Arctic.

Sudden ice fog formation over a wide area may be triggered by local sources of water vapor, condensation nuclei, or turbulence, such as aircraft, automobiles, factories, laundries, animal herds, etc. When the wind is very light and the temperature is $-30°F$ or lower, ice fog often forms almost instantaneously in the exhaust gases of automobiles and aircraft. It may last only a few minutes but can also persist for several days.

Low Stratus Clouds

Stratus clouds, like fog, are composed of extremely small water droplets or ice crystals suspended in the air. The main distinction from fog is that stratus is a layer above the ground and does not reduce the horizontal visibility at the surface below it. An observer on a mountain, enveloped in the layer, would call it fog, while one farther down the slope would call it stratus.

Stratus and fog frequently exist together. A cross-section of such a condition might appear as a layer of suspended water droplets extending from the ground to some height—perhaps several hundred feet or more—suddenly becoming denser as you enter the cloud base. Because of the reduction in upward visibility, the observer on the ground recognizes the condition as stratus. There is no firm distinction between stratus and fog other than height above the ground. In the vertical, it is a sudden transition from a less dense fog to a fog that gives the effect of a cloud.

Establishing alternate routes and destination airports before you depart, even for a VFR flight, is one way of preventing Mother Nature from playing tricks with your visibility. ■

Editor's Note: This article was written originally for the Military Airlift Command's MAC FLYER, by Major Thomas C. Weinzierl.